Concept: Brad Thomas Illustration: David M. Russell

Space Center Roundup

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Roundup

Astronaut Steve Robinson, STS-114 mission specialist, anchored to a foot restraint on the International Space Station's Canadarm2, participates in the mission's third spacewalk.

NASA S114E6642

THE YEAR IN
review

FROM THE

director

A MESSAGE FROM CENTER DIRECTOR MICHAEL L. COATS

Thank you!

Over the last few weeks I've been learning a lot about the various ways so many of you are putting time, effort and money into local activities, and I wanted to express my appreciation to all of you who volunteer and actively support our Houston area communities. Communities are not made of buildings and roads and trees. Communities are built by people, families and children.

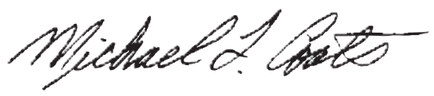
My first example of "space volunteers" came many years ago when I was recruited to coach Little League and Pony League baseball teams here in the local area. I was more anxious than during a countdown sitting on the launch pad. I had played football and basketball but couldn't hit either a curveball or a fastball, so teaching baseball was intimidating. I had to attend clinics and read a lot of books to learn how to teach the correct fundamentals. Fortunately, we had several young NASA engineers who not only had played baseball but were superb at working with and relating to the youngsters. Without children of their own, they gave up a considerable amount of their personal time to help coach the teams and taught me a tremendous amount as well, both about baseball and generosity. I was impressed with their selflessness and eagerness to help and teach others.

We all want our families to enjoy the many advantages of living in our 21st century society, but we must remember that we have those advantages because the generations before us worked hard to improve their lives and the lives of others. I've read stories about how we all spend too much time in front of the TV or computer screen nowadays, and we don't spend as much time as we used to with personal interaction and getting to know our neighbors. While video games are highly popular and there may be a kernel of truth in those stories, I frankly haven't seen that much of a problem. People need people and that's not going to change, even with better video games and HDTV. My experience over the last 25 or 30 years is that, when help is needed in the community, there is no shortage of volunteers.

I was delighted with the number of volunteers to help support Congresswoman Sheila Jackson Lee's Toys for Kids event. This is an annual event sponsored by the congresswoman that benefits more than 3,000 disadvantaged children in the Houston area.

I am proud to know that the spirit of generosity I encountered many years ago still exists here. The space workforce is talented and highly educated, and the vast majority has and will continue to put their gifts to work in ways to benefit the community. Once again, thank you.

Mike



2005

THE KEY ELEMENTS OF OUR

success

PRINCIPAL FUNCTIONS

- Space shuttle
- International Space Station
- Advanced Human Support Technology
- Biomedical Research and Countermeasures
- Space Medicine
- Space Operations/Communications Management
- Extravehicular Activity
- Curatorial Care and Study of Lunar/Planetary Materials
- Astronaut selection and training
- Constellation Program

MAJOR FACILITIES

- Consolidated Mission Control Center (Shuttle and Station)
- Shuttle and station simulators and trainers
- White Sands Test Facility (located in New Mexico)
- Shuttle Avionics Integration Laboratory
- Shuttle Engineering Simulator
- Biomedical Operations Laboratories
- Space Environment Simulation Laboratory
- Vibration Acoustic Test Facility
- Anechoic Chamber Facility
- Lunar Sample Facility
- Sonny Carter Training Facility/Neutral Buoyancy Laboratory
- Human Research Facility (under development)

NUMBER OF EMPLOYEES AT JSC

In January 1964, 2,100 employees were readying for the move on site at JSC (known at that time as Manned Spacecraft Center) with the remaining 600 personnel to be on site by July.

Today there are 3,172 civil service employees, the majority of whom are professional engineers and scientists. Of these, approximately 92 are active astronauts. Many companies provide contractor personnel to JSC. More than 12,000 contractors work on site or in nearby office buildings and other facilities.

JOHNSON SPACE CENTER LOCAL ECONOMIC IMPACT OF CIVIL SERVICE WORKFORCE IN FISCAL YEAR 2004

Communities	Total Number of Employees	Estimated Income* of Employees (Dollars in Millions)
Webster	91	8.0
League City	484	44.8
Seabrook/El Lago/Taylor Lake	273	27.4
Kemah/Bacliff	44	4.1
Nassau Bay	22	2.3
Clear Lake City	938	96.3
Friendswood	371	38.7
Dickinson	61	5.1
Alvin	42	3.8
Pearland	144	13.9
LaPorte/Shoreacres/Baytown	48	3.9
Pasadena/Deer Park	59	4.6
Other Houston Area	394	33.8
Other Galveston County**	63	5.7
TOTAL	3,034	292.4

* Information based on W-2 data provided by the JSC Financial Management Division. Income is defined as gross income less FICA, Health Insurance Tax (HIT) for Medicare, and Permanent Change of Station HIT related taxes and expenses. In addition to the current employees, there are JSC retirees living in the local area, but their economic impact is not reflected above.

** Includes LaMarque, Santa Fe, San Leon, Texas City and the city of Galveston.

statistics

NASA/Blair JSC2005E34995

Paul Teutul, Sr. of Orange County Choppers gets a hero's welcome as he weaves between fans aboard the Space Shuttle Tribute Bike at Space Center Houston.

Around the Center

GRIFFIN BECOMES NEW NASA ADMINISTRATOR

Michael Griffin returned to NASA as the agency's 11th administrator in April. Griffin, who served as NASA's chief engineer earlier in his career, took the helm of the agency as it is charting a new course.

"I have great confidence in the team that will carry out our nation's exciting, outward-focused, destination-oriented program," Griffin said. "I share with the agency a great sense of privilege that we have been given the wonderful opportunity to extend humanity's reach throughout the solar system."

In his first address to NASA employees, Griffin said he would focus immediately on Return to Flight efforts, and noted that the agency has much on its plate right now. "It's going to be difficult, it's going to be hectic, but we will do it together," he said.

NASA NAMES FORMER ASTRONAUT NEW CENTER DIRECTOR

Michael L. Coats was named director of Johnson Space Center in November. Coats is a former astronaut and formerly served as vice president of Lockheed Martin Astronautics in Denver. He will become the ninth person to serve as director in the Center's 44-year history.

"Mike Coats brings a perfect blend of experience to his new role as the head of the nation's primary center for human spaceflight development and operations," Griffin said. "As a former pilot and astronaut and a long-time aerospace industry executive, he knows what our next generation of manned spacecraft must be able to do, and he knows what it takes to produce them. I'm delighted to welcome Mike back home to NASA."

Coats joined NASA in 1978 as a member of the first astronaut class specifically selected to fly the space shuttle. He flew three shuttle missions, the first as pilot for the maiden flight of *Discovery* in 1984. He commanded two subsequent shuttle missions, logging a total of more than 463 hours in space.

Before joining NASA, he was a distinguished U.S. Navy aviator. He logged more than 5,000 hours of flight time in 28 different types of aircraft. He retired from NASA and the Navy in August 1991.

NASA/Blair JSC2005E45823

Diana Norman, administrative officer in the Project Management Building, and Leonard Yowell (center), assistant to JSC Director Michael L. Coats, join in a discussion with the director prior to festivities commemorating the fifth anniversary of continued occupancy of the International Space Station.

"I look forward to returning to JSC, and I am honored by the trust Mike Griffin has shown in me," Coats said. "We will embrace the challenge of the new Constellation Program that will take us first to the moon and then on to Mars. At the same time, the contributions of the space shuttle and International Space Station will be critical steps in that journey, and we remain committed to their success."

Coats replaces Jefferson D. Howell Jr., who is on assignment as a visiting professor to the Lyndon B. Johnson School of Public Affairs at the University of Texas at Austin.

SPACE SHUTTLE TRIBUTE BIKE

JSC teamed up with the Discovery Channel's popular "American Chopper" television show this year to create the Space Shuttle Tribute Bike—a long, lean chopper-style motorcycle that features art work and design that showcases the shuttle. The bike was designed to honor the hands-on, unique American style that is reflected in the work ethic that built the space program.

The idea originated at JSC as a way to honor all those who make the space shuttles fly. Originally conceived as a tribute to the STS-107 crew, the project morphed into one that recognizes all those who work in the space program—from astronauts to program staff to the hands-on workers at various NASA centers.

The motorcycle, built by Orange County Choppers of New York, is funded solely through donations from NASA workers and individual space program supporters.

STARPORT

JSC employees have been enjoying the many improvements that have taken place in employee services across the center. These services, known as Starport, include updates to the two on site cafés, catering, vending services, gift shops and the newly renovated Gilruth Center.

Employees now have a premier food-service company, Sodexho, that offers a signature food program with high-quality products and a wide variety of healthier, trendier dining choices. Both JSC cafeterias were remodeled and now feature up-to-date décor.

Starport Fitness, located at the Gilruth Center, is also getting some attention. A major renovation of the Gilruth, expected to be completed early this year, will give the facility increased square footage, two new exercise rooms, larger men's and women's locker and shower facilities and an expanded weight room.

Also included in the Starport program is the upcoming JSC Wellness Program, which will provide a more integrated focus and delivery on individual health, fitness and wellness for the entire JSC family.

ASTRONAUT QUARANTINE

While most people might not break in anything bigger than a new pair of boots, the crew of STS-114 had the distinct honor of taking the newness out of Building 27, the new Astronaut Quarantine Facility.

NASA/Markowitz JSC2005E27959

Building 27

May 3, 2004, marked the historic groundbreaking ceremony for Building 27. A little more than a year later, on June 3, the building was completed and ready to use for the astronauts of NASA's Return to Flight mission. The STS-114 crew occupied the new building during their preflight quarantine.

The new Astronaut Quarantine Facility is one-of-a-kind at JSC in that it was designed and constructed to meet all requirements of sustainability, or the use of environmentally friendly materials. The special materials used include recycled structural steel framing; recycled rubberized flooring; highly efficient heating, ventilation and air-conditioning systems; energy monitoring control systems and more.

The 12-bedroom Astronaut Quarantine Facility is equipped with private baths, a kitchen and a fully equipped workout room. It also features a medical exam room where the astronauts will receive their pre- and postflight exams.

No detail has been overlooked for this project, including the landscaping around the building. Landscape features include a retention pond to minimize run-off from heavy rains, use of native trees and vegetation, blackstone gravel driveways and grass-pave parking areas.

The facility is in the process of receiving Leadership in Environmental and Energy Design certification by the United States Green Building Council.

The Starport campaign included the remodeling of the cafés into more modern and stylish facilities with enhanced services. Here JSC team members are checking out the newly revamped Building 11 Starport Café.

NASA/Markowitz JSC2005E06203

Community

2005 was a busy year for the JSC family and its role in the Houston community. Employees participated in a wide range of activities including hosting the JSC Open House, aiding in hurricane relief efforts and taking part in the Ballunar Liftoff Festival and Wings Over Houston.

JSC OPEN HOUSE

For the first time in nearly four years, JSC opened its gates to over 30,000 visitors for an Open House in April.

Guests were able to shake hands with astronauts, tour Mission Control and hold pieces of real space hardware in their hands. Visitors also had the opportunity to see the science, engineering and human element behind space exploration as full-size models of spacecraft, space hardware and other exhibits were featured throughout the center.

HURRICANE RELIEF

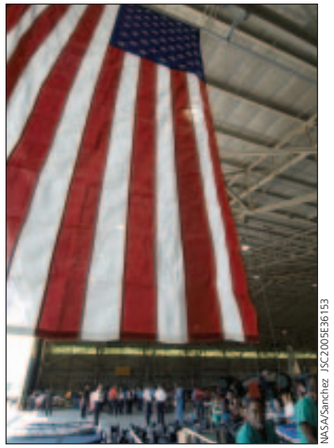
JSC employees participated in numerous relief efforts for those affected by Hurricane Katrina in August.

More than 350 JSC employees volunteered space in their homes to house NASA and contractor coworkers who were displaced by the storm. An emergency operations center at JSC aided NASA coworkers in those areas seeking shelter by coordinating the placement of evacuees both at JSC and at other NASA centers around the country.

NASA's aircraft Hangar 990 at Ellington Field was a primary triage location through which patients who were evacuated by air pass awaited ground transportation to other facilities in Houston. Aircraft from JSC were also used to airlift a variety of support equipment to the NASA facilities damaged by the storm.

ASTROS BASEBALL

JSC employees supported the Houston Astros during their quest for the National League championship in October by carrying the United States flag onto the field at Minute Maid Park. Forty volunteers participated in the pre-game ceremony that featured the Astros and the St. Louis Cardinals. Also featured in the festivities were singer Clay Walker, who performed the national anthem, and Nolan Ryan, who threw out the first pitch.



NASA/Sanchez JSC2005E36153

Ellington Field served as a staging point for JSC team members as they assisted Hurricane Katrina victims on their way to the Texas Medical Center.

NASA/Markowitz JSC2005E15290

The annual JSC picnic was a lot of fun for families, with festivities including clowns, face-painting, astronaut autograph-signing, Looney Tunes characters, games and an all-you-can-eat buffet.

NASA/Sowa JSC2005E42338

JSC team members had the opportunity to support their hometown Houston Astros in a National League championship game by carrying the U.S. flag onto the field during pregame ceremonies on Oct. 15.

International Space Station

INVESTIGATING OUR WONDROUS WORLD EACH AND EVERY DAY

The space station, since its inception in 2000, has been a faithful workhorse to NASA. This November, the space program celebrated five years of continuous human presence on the station. With the hard work and dedication of 12 Expedition crews and counting, the station will continue to thrive as the only research laboratory of its kind.

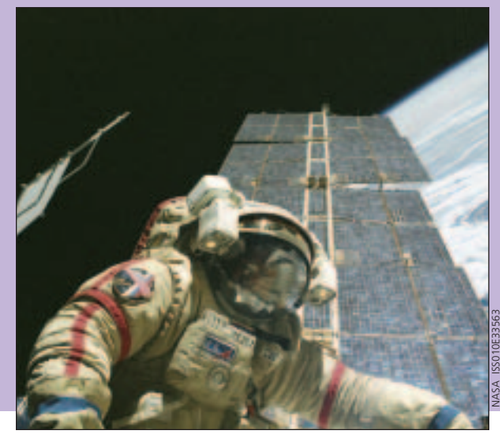
Expedition 10 wrapped up its mission early in 2005, furthering the Vision for Space Exploration with scientific and medical research studies. The Expedition 10 crewmembers also completed two spacewalks designed to continue the external outfitting of the Zvezda Service Module.

The crew of Expedition 11 had the privilege of working with the STS-114 crew during its Return to Flight mission. STS-114 was the first crew to be welcomed to the station since December 2002. The two Expedition 11 crewmembers installed the Human Research Facilities Rack 2 inside the station to enhance its research capabilities. Both station crewmembers also had moments of distinction on the mission: Science Officer and Flight Engineer John Phillips testified before Congress while in space, and Commander Sergei Krikalev amassed a new time-in-space record.

Expedition 12 kicked off its mission on Sept. 30. In addition to maintaining the station's current operational state, this mission will add several thousand hours to the more than 100,000 hours of cumulative experiment operation time. The crew will also complete numerous spacewalks to further space station assembly.

On Sunday, Nov. 13, a delightful surprise awoke the Expedition 12 crewmembers when Paul McCartney sang "Good Day Sunshine" and "English Tea" to both them and an audience in Anaheim, Calif. The performance, which was part of McCartney's "US" Tour, was the first time a live concert was linked to a U.S. spacecraft. The surrealism of the moment was not lost on McCartney.

"I can't believe that we're actually transmitting to space!" McCartney said. "This is sensational. I love it."

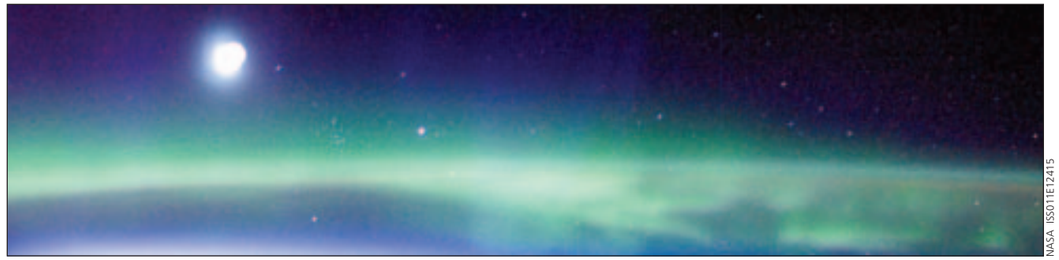


NASA ISS010E33563

Astronaut Leroy Chiao, Expedition 10 commander and NASA ISS science officer, wearing a Russian Orlan spacesuit, participates in the first of two spacewalks performed by the Expedition 10 crew during their six-month mission.

NASA ISS011E12410

The STS-114 and Expedition 11 crewmembers gather in the Destiny Laboratory of the International Space Station.



NASA ISS011E12415

Aurora Borealis and lights in Finland, Russia, Estonia and Latvia are featured in this digital still picture taken by the Expedition 12 crew aboard the space station.

Return to Flight

Space Shuttle *Discovery* launched from NASA's Kennedy Space Center July 26, ending a two-and-a-half year wait for the historic Return to Flight mission. STS-114 included breathtaking in-orbit maneuvers, tests of new equipment and procedures, and a first-of-its-kind spacewalking repair.

The flight provided unprecedented information on the condition of an orbiter in space. Astronaut Soichi Noguchi, representing Japan Aerospace Exploration Agency, and Steve Robinson, STS-114 mission specialist, did three successful spacewalks at the International Space Station and *Discovery* transported tons of equipment and supplies to and from the station.

Discovery touched down Aug. 9 at Edwards Air Force Base in California, capping a 5.8-million-mile journey and successful reentry. The orbiter returned Aug. 21 to Kennedy Space Center atop a modified Boeing 747 called the Shuttle Carrier Aircraft.

NASA STS114-S-022

***Discovery** and its seven-member crew launch at 10:39 a.m. EDT and begin the two-day journey to the International Space Station.*

NASA ISS011E11074

This is an image taken by NASA Science Officer and Flight Engineer John Phillips of Discovery as it approaches the station and performs a backflip to allow photography of its heat shield. Discovery was about 600 feet from the station. Station Commander Sergei Krikalev and Phillips took photos for about a minute and a half as Discovery Commander Eileen Collins guided the spacecraft through the flip. The photos will be analyzed by engineers on the ground as additional data to evaluate the condition of Discovery's heat shield.

NASA STS114-S-045

The STS-114 crewmembers gather for a crew photo in front of Space Shuttle Discovery following landing at Edwards Air Force Base in California. From the left are astronauts Steve Robinson, mission specialist; Eileen Collins, commander; Andy Thomas, Wendy Lawrence, Soichi Noguchi representing Japan Aerospace Exploration Agency, Charlie Camarda, all mission specialists; and Jim Kelly, pilot.

NASA S114E6221

One of the STS-114 crewmembers holds a piece of the gap filler material (inset), which had been protruding from between Thermal Protection System tiles and which was retrieved during the third spacewalk of the flight by Mission Specialist Steve Robinson. Robinson (left) used his gloved fingers to pull out this gap filler and another one from Discovery's belly while carefully supported and maneuvered by the Canadian-built remote manipulator system, operated inside Discovery's cabin by astronauts Wendy Lawrence and Jim Kelly.

NASA S114E6062

Astronaut Soichi Noguchi, STS-114 mission specialist representing Japan Aerospace Exploration Agency, participates in the mission's first scheduled session of extravehicular activity. Noguchi and crewmate Steve Robinson (out of frame) completed a demonstration of shuttle thermal protection repair techniques and enhancements to the International Space Station's attitude control system during the successful six-hour, 50-minute spacewalk.

NASA/Markowitz/Blair/Sanchez JSC2005E33332

STS-114 Commander Eileen Collins is visibly moved by the crowd's enthusiasm at the homecoming ceremony in Ellington Field's Hangar 276.

Exploration

NASA took the first exciting steps toward realizing the Vision for Space Exploration in 2005, steps that ensure JSC will be in the vanguard.

After taking the helm in April, NASA Administrator Michael Griffin guided a thorough Exploration Systems Architecture study and announced the results of it in September. The new architecture calls for a family of spacecraft that will lift off for the moon in the next decade and serve as the foundation for missions to Mars and beyond. Next, Griffin appointed veteran astronaut Scott Horowitz to lead the Exploration Systems Mission Directorate that will chart NASA's exploration course.

In October, Griffin created the Constellation Systems Program Office at JSC and appointed veteran flight director Jeff Hanley to manage the nuts-and-bolts of designing, building and operating the new fleet. This work includes launch systems, crew, cargo and transfer vehicles, lunar landers and surface systems, habitats, rovers and planetary spacesuits, and a host of infrastructure and supporting systems.

One of the main vehicles in the program will be the Crew Exploration Vehicle, which will carry as many as four humans to lunar orbit and safely home to Earth and as many as six crewmembers to the International Space Station or to a vehicle headed for Mars. Using a shape similar to that of the Apollo spacecraft, this new crewed capsule will take advantage of the latest in communications, navigation and life support technology. It will be launched into orbit using rockets based on existing shuttle boosters and engines, then be carried on to the moon by engines originally designed for the Apollo Program. But first, it will prove itself by carrying crew and cargo to the International Space Station.

Work on the new capsule and parachute reentry systems is ramping up at JSC, with the first parachute tests scheduled for early next year. Astronauts, engineers and life scientists are beginning to design the interior layout of the capsule cockpit using a full-sized mockup assembled in the Building 9 Space Vehicle Mockup Facility.

By this summer, a prime contractor for the crew vehicle will be chosen to complete the designs that will lead to a first flight in slightly more than five years.

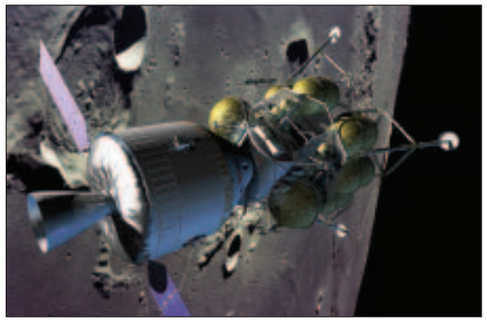
The launch system that will take the crew to space builds on powerful, reliable shuttle propulsion elements. Astronauts will launch on a rocket made up of a shuttle-derived solid rocket booster, with a second stage powered by a shuttle main engine.

A second, heavy-lift system uses a pair of longer solid rocket boosters and five shuttle main engines and a newly designed stage to put up to 125 metric tons in orbit—about one-and-a-half times the weight of a shuttle orbiter. This versatile system will be used to put the components needed to go to the moon and Mars into orbit.

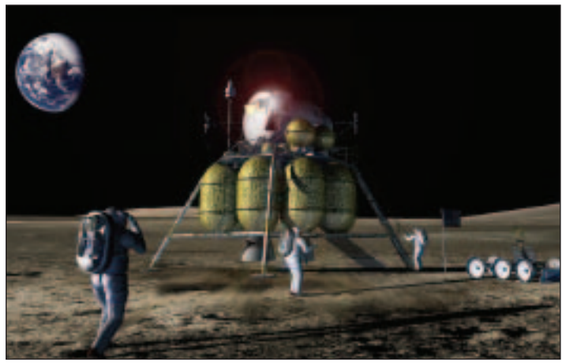
The crew launches separately, then docks their capsule with the lander and departure stage and heads for the moon.

All images by John Frassanito and Associates

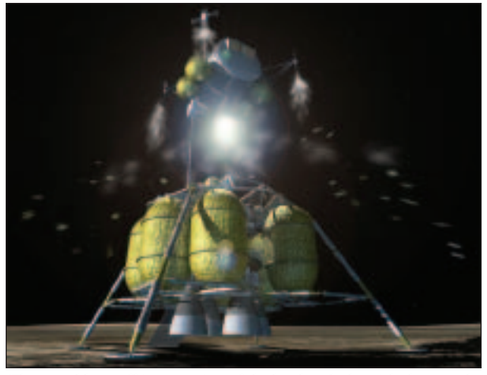
The new ship will also ferry crew and supplies to the International Space Station.



After a three-day trip to the moon, the crew goes into lunar orbit.



After landing on the lunar surface, a crew consisting of up to four members leaves the crew module unmanned in orbit and explores the surface.



The crew blasts off in a portion of the lander, docks with the capsule and travels back to Earth.

After a de-orbit burn, the service module is jettisoned, exposing the heat shield for the first time in the mission. The parachutes deploy, the heat shield is dropped and the capsule sets down.